REMARKS

Applicants submit herewith a replacement drawing sheet containing Figures 5 and 6. Applicants respectfully request that the Examiner approve the same.

This amendment is submitted in response to the Office Action mailed on November 26, 2007. Applicant has considered the Office Action in the above-captioned application and requests reconsideration of the claims in light of the amendments and remarks presented herein. Claims 1-17 are pending in this application after entry of this amendment.

Applicant acknowledges that the finality of the previous office action has been withdrawn in order to consider a newly uncovered reference (Ayter et al. US 6558330). Claims 1-17 are now rejected under 35 USC 102(e) as anticipated by Ayter et al, or in the alternative, as being obvious under 35 USC 103(a) over Ayter et al in view of Fraser (US 6328697).

The examiner argues that Ayter et al suggests that the cMUT cavity defined by support electrode 16 and membrane electrode 16 and insulating substrate 12 which comprises the walls of the cMUT well may be partially filled by an area of insulating material 40, and which the examiner further argues may be characterized as a 'post'. The examiner has taken the opportunity of the office action to remind the applicant of his earlier statement as to certain embodiments of the invention where the posts or areas are not constrained to any shape regularity or particular cross-section. This is then used by the examiner to open the opportunity to argue that Ayter et al having a single unshaped material that fills the cavity to a certain height would qualify as a post.

Applicant agrees that the posts or areas are not constrained to any particular shape or cross section in the context of the other requirements, but with the proviso that the posts or area also conform to the other requirements described in the application which impute additional limitations on the size, thickness or height, total area relative to the membrane, as well as other possible limitations. This includes preventing contact and reducing or minimizing the accumulated charge or capacitance as compared to a fully covered isolation layer.

In this context, the examiner has suggested that "the solid elastomeric or polymer variant described in col. 3 lines 22 - 33 [of Ayter et al.] would be either an area or post, the latter in the sense of 100% fill of the cMUT chamber up to the fractional fill height desired". The examiner further suggests that in Ayter the stated purpose is electrical isolation and that charge accumulation prevention would "inherently follow" intrinsic to the nature of plate capacitance.

Applicant respectfully disagrees with the characterization of Ayter et al as anticipating or in the alternative obviating Applicant's invention. Even were some inherent plate capacitance issues to be raised, there is no teaching or suggestion of minimizing accumulated charge or capacitance relative to a fully covered isolation layer. Ayter et al should be compared with the invention as a whole and it is apparent that a cMUT having a chamber completely filled or partially filled with a material over the full area of the membrane up to a "fractional fill height" as in Ayter et al will not provide the structure or function recited in the claims.

Applicant understood the difference between a cMUT with a fully covered isolation layer and a cMUT with isolation post, and the difference is illustrated in the Capacitance vs. Voltage curves of FIG. 6 of the application as filed as well as described elsewhere in the application. Applicant notes that the scanned version of FIG. 6 of record in the office may have obliterated the numbers at the border of the graphs which were on a darker background and a replacement drawing including FIG. 5 and FIG. 6 having better reproduction quality is attached. These drawings provide enabling support for features now recited in some of the newly added claims as well It also appears that the formal drawings submitted for FIG. 5 and FIG. 6 were based on the scanned/copied version of the figures on file and did not include reference values of the graph. Applicant herewith submits replacement formal figures for FIG. 5 and FIG. 6 to remedy this problem. No new matter is added.

It is apparent from the FIG. 6 graph that the capacitance is relatively uniform and substantially unchanged for a cMUT having a first set of posts with only a slight increase between 30 volts and approximately 72 volts (interpolating from the graph) where capacitance rises from about 150 fF (femto-Farads) to no more that about 160 fF, while over the same voltage charge or capacitance rises from about 150 fF to about 250 fF for the fully covered isolation layer. It is only at about 80 volts that the DC bias point is reached for a cMUT with posts that the capacitance increases rapidly and meets the curve for a cMUT with fully covered isolation layer. When a 2nd set of posts is added the voltage range for which the capacitance is reduced is extended further.

Applicant further observes that the cavity of the cMUT in Ayter et al as well as in other known cMUTs is that the cavity can only be partially filled because there is a need for space for the membrane to move inward and outward and that a cMUT that is completely filled would not work at all since the membrane could not vibrate. Although applicant submits that the independent claims previously submitted distinguish from Ayter et al alone or in combination

with Fraser, applicant has further amended the claims to even further define and distinguish over the cited art. More particularly, claim 1 (and the other independent claims) has been amended to recite a relationship between the membrane surface area and the area of the posts that cover or are disposed adjacent to the full membrane surface area. In the independent claims not presented, it is specifically recited that the surface areas of the "isolation posts or areas" should be smaller that the "full membrane electrode surface area". The precise claim 1 language is "*the amount of the membrane electrode surface covered by or disposed adjacent to the at least one isolation post or area being smaller than the full membrane electrode surface area to reduce accumulation of charge between the post or area and the membrane electrode, and the thickness selected to prevent contact of the membrane electrode to the support electrode during operation of the transducer*". With this claim amendment, Ayter et al is clearly removed as an anticipating reference under 35 USC 102(e). It is also apparent from the application disclosure as filed that the to achieve both goals of preventing contact and reducing accumulation in charge that the surface of the posts or areas should be relatively small as compared to the total membrane surface. In at least one embodiment, the areas of the isolation posts are described as being very small as compared to the full membrane surface area.

The other independent claims have been analogously amended to distinguish over Ayer et al and Fraser and these amendments are apparent in the claims and not further discussed here.

The examiner may note that the problem associated with accumulated charges is quite severe and that a structure that both prevents contact of the membrane and its associated electrode with the other electrode and reduces the accumulated charge or capacitance is a significant improvement over the prior art. Not withstanding the examiners suggestion regarding charge accumulation, Applicant respectfully submits that the structure of Ayter does not solve the charge accumulation problem at all because the electrode is 100% fully covered with the insulation material.

Making the isolation posts to have an appropriate thickness/height and a relatively small area relative to the total membrane area is important for achieving the goals of the invention. In paragraph [004] of application as published, this problem is described relative to prior art structures: *"The electric field between the electrodes can attract and trap charges 17 either on the surface of or in the insulating layer 14. The charges stay in the trapping cites for a long period because there is no DC path to discharge them. The accumulated charge shifts the DC*

voltage between the two electrodes away from the applied voltage by a random value. This dramatically degrades the reliability and repeatability of device performance." Applicant submits that Ayter et al is this type of device and that its structure does nothing to solve the problem or overcome the limitations.

In preferred embodiment of Applicant's invention in which the posts are small and of the appropriate height/thickness, the effect of charging or charge accumulation is negligible. The structure of Ayter et al does not do anything to "reduce accumulation of charge" as now recited or "minimize the number of trapped charges" as recited in the previous claims. These differences are also apparent from the different curves in FIG. 6 of applicant's specification.

As the examiner recognized in the present office action, Ayter et al alone under any interpretation does not anticipate the claims since "charge and its manner of accumulation and distribution and factors which affect this are undiscussed". Applicant agrees.

Applicant further submits that Fraser (US 6328697) is not relevant to solving the charge accumulation problem with respect to a dielectric or insulation material and that even if combined with Ayter et al does not obviate the invention especially as now claimed. The referenced FIG. 2 and FIG. 3 structures appear to illustrate a conductive (rather that dielectric or insulating) post shape of the bottom electrode and its charging distribution. Each of applicant's claims require that the isolation posts or areas are of "insulating material". The conductive post there does not have any function to solve the device performance or reliability issues due to charging and charge accumulation in a CMUT. Neither does Fraser disclose or suggest any structure using a dielectric material (or insulation material) to prevent shorting of the cMUT electrodes. Therefore even if Ayter et al were to be combined with Fraser in the manner suggested, it would not result in applicant's invention as claimed. Applicant reiterates that there is nothing in the combination of Ayter et al and Fraser that obviates the intention as now claimed.

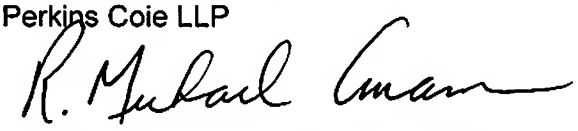
CONCLUSION

In view of the foregoing, it is respectfully submitted that the claims of record are allowable and that the application should be passed to issue. Should the Examiner believe that the application is not in a condition for allowance and that a telephone interview would help further prosecution of this case, the Examiner is requested to contact the undersigned attorney at the phone number below.

The Commissioner is authorized to charge any fees that may be due as a result of filing this amendment, including additional claims fees not already paid for, fees for Extension of Time, or other fees that have not been separately paid, to Deposit Account 50-2207 (Attorney Docket 60849-8011-US01).

Applicant submits the claims are in condition for allowance, and notification of such is respectfully requested. If after review, the Examiner feels there are further unresolved issues, the Examiner is invited to call the undersigned at (650) 838-4300.

Respectfully submitted,
Perkins Coie LLP



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